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W. HANLEY & M. B. MILLS.

GATE FOR RAILWAY CROSSINGS.

No. 301,589. Patented July 8, 1884.

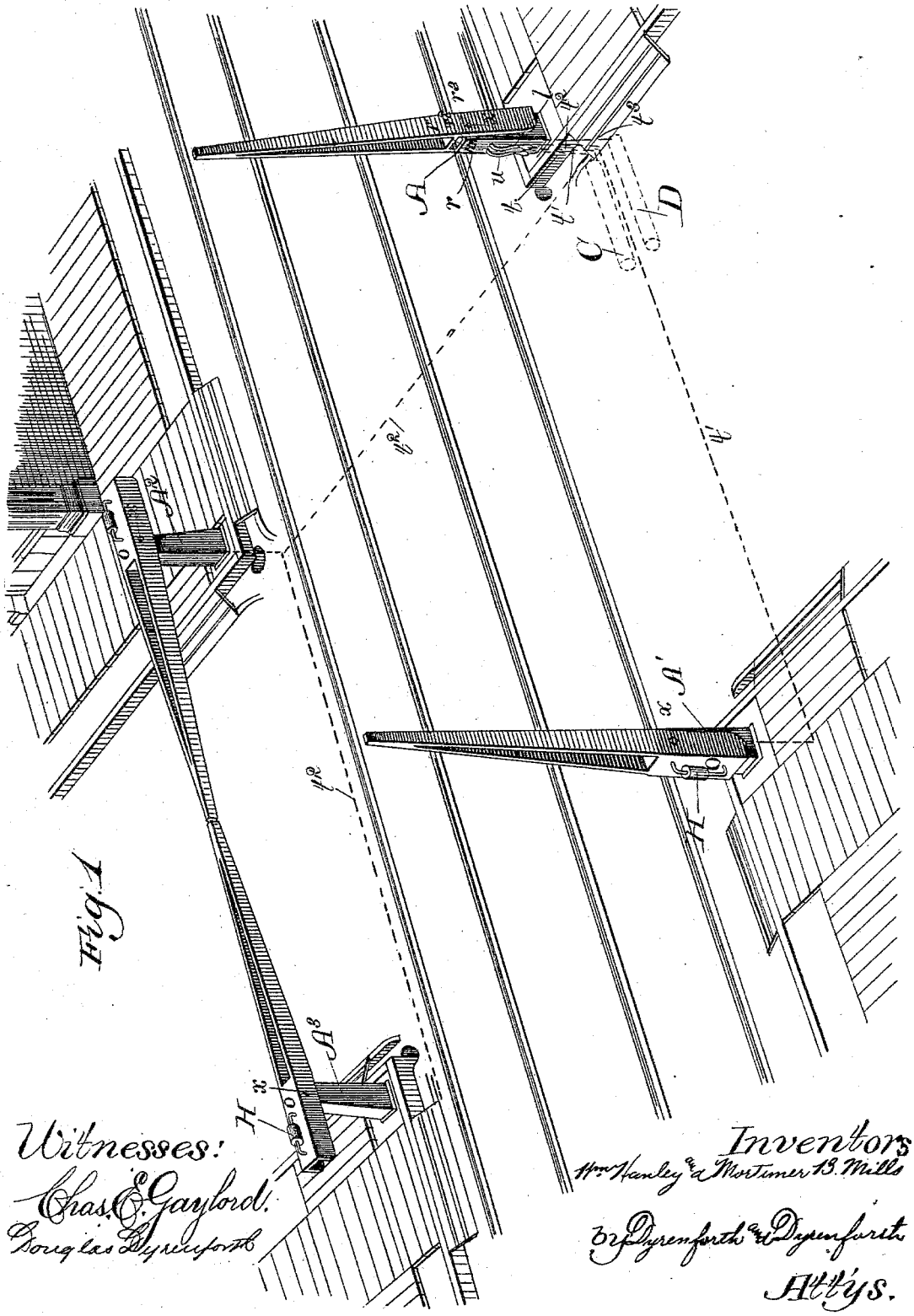

Fig. 1

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Fig. 2.

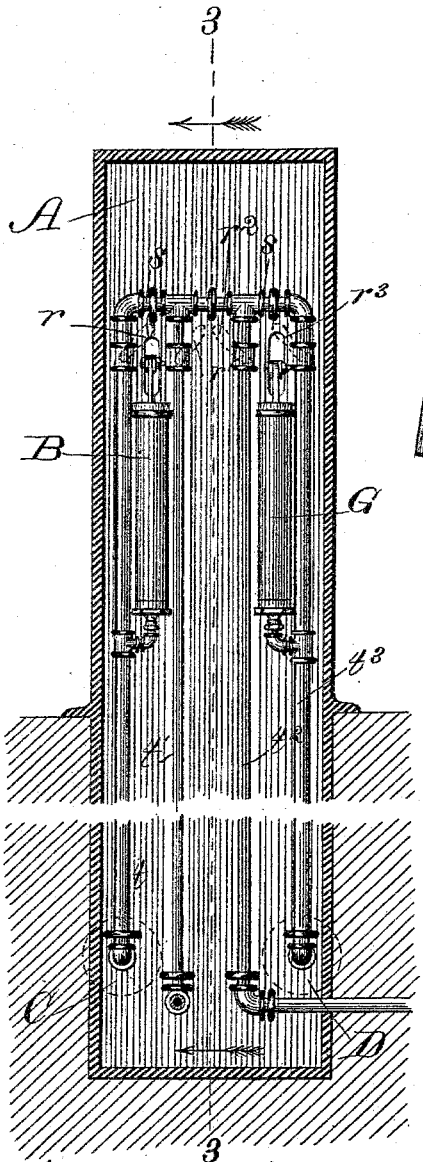
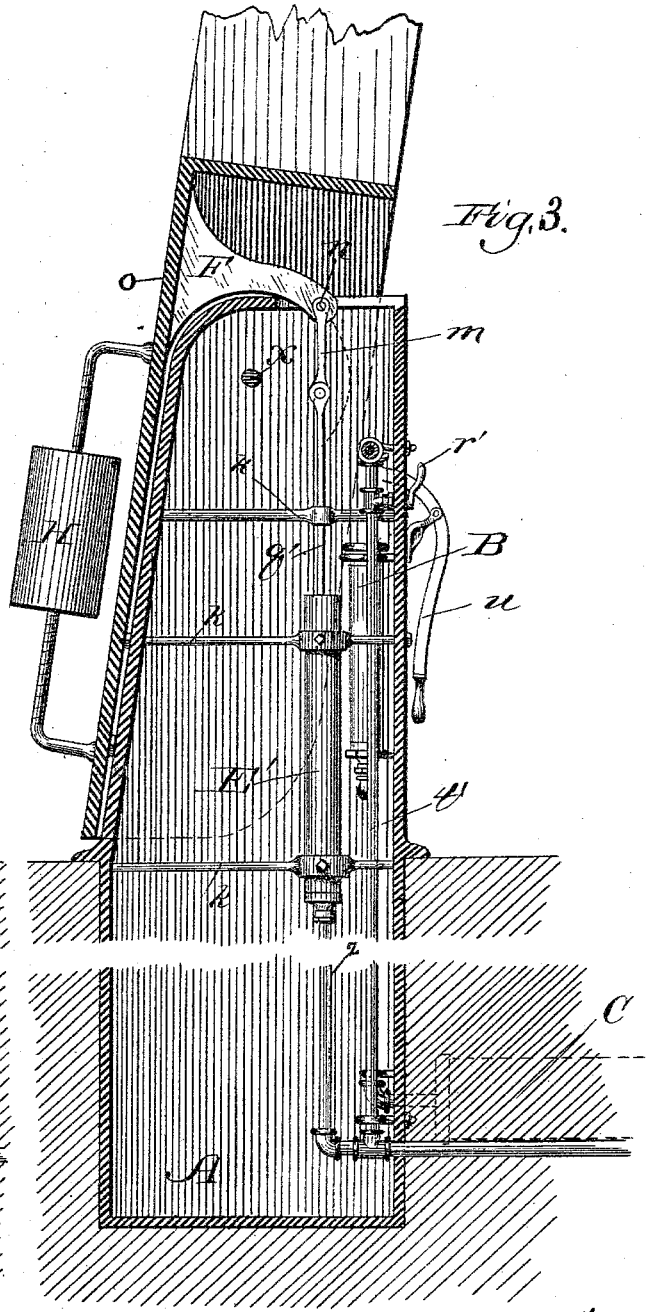


Fig. 3.



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(No Model.) 4 Sheets—Sheet 3.

W. HANLEY & M. B. MILLS.

GATE FOR RAILWAY CROSSINGS.

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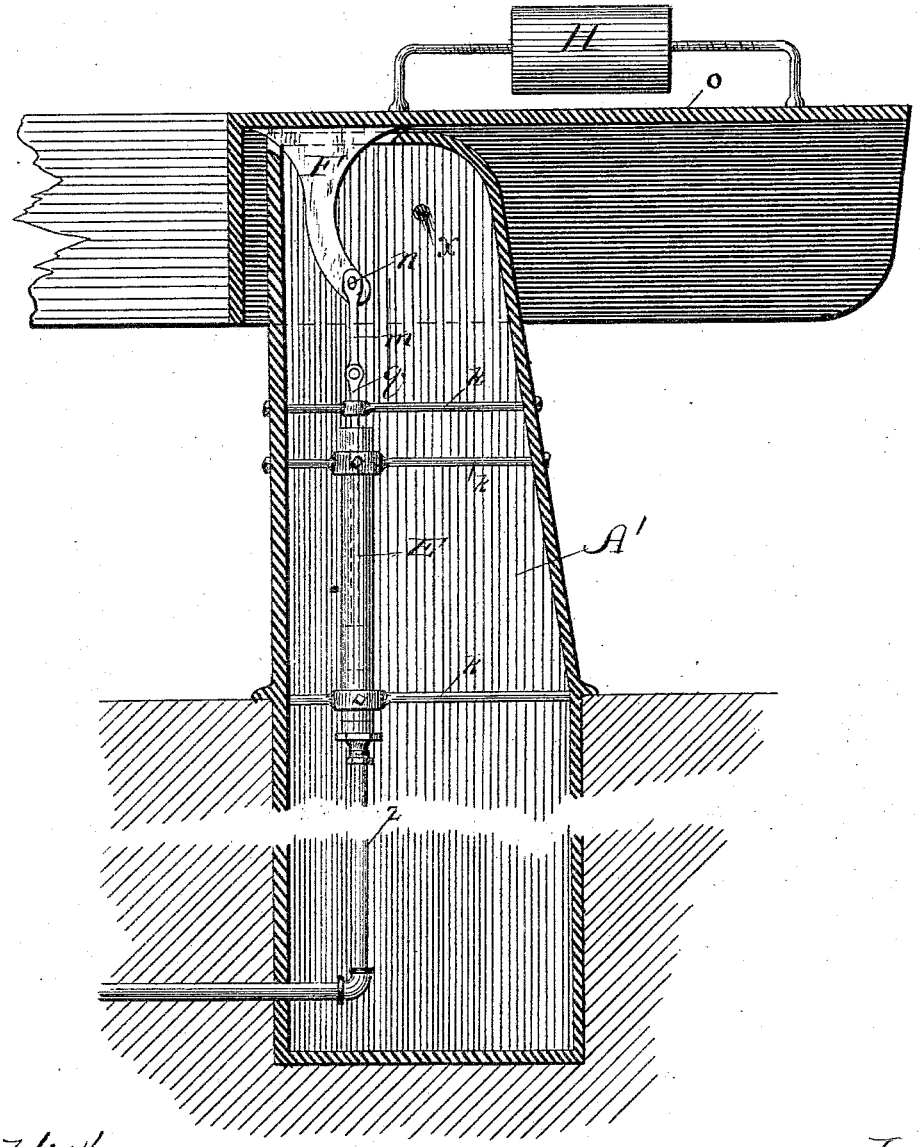
Fig. 4.



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(No Model.) 4 Sheets—Sheet 4.

W. HANLEY & M. B. MILLS.

GATE FOR RAILWAY CROSSINGS.

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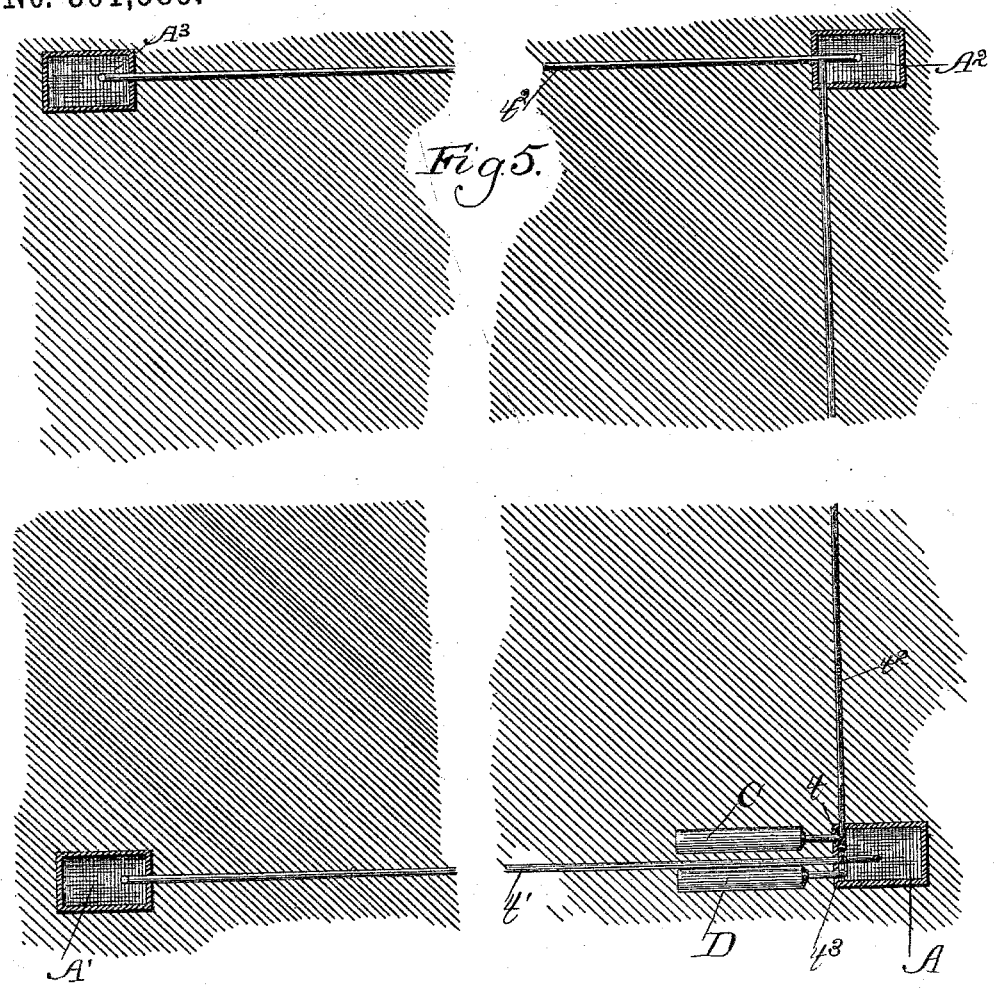

Fig. 5.

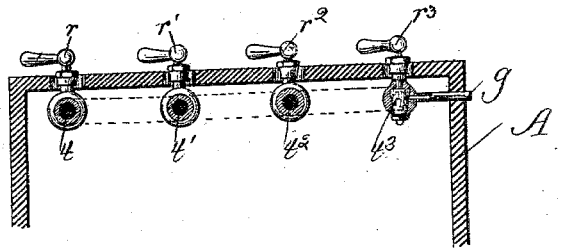

Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM HANLEY AND MORTIMER B. MILLS, OF CHICAGO, ILLINOIS.

GATE FOR RAILWAY-CROSSINGS.

SPECIFICATION forming part of Letters Patent No. 301,589, dated July 8, 1884.

Application filed November 28, 1883. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM HANLEY and MORTIMER B. MILLS, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Gates for Railroad-Crossings; and we hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates to the class of gates for railway-crossings, bridges, ferries, and the like, each gate comprising two parts, consisting of two standards or posts located on opposite sides of the gate-opening, each standard supporting a gate-bar pivoted upon it, and capable of a vertically-swinging motion, effected by suitable mechanism, whereby the bars may be lowered in a direction toward each other to meet at a desired point, thus forming a barrier to prevent the passage of vehicles, &c., and raised at the proper time to permit such passage.

It is the purpose of our invention to provide gates—one for each side of a crossing—the bars of which, forming the gates, may be operated from a single post to form both gates simultaneously, or only one gate at a time, as the will of the operator shall direct.

Our invention consists in the particular mechanisms hereinafter described and claimed, by means of which vertically-swinging gates are actuated by atmospheric pressure to open and close.

Our device is by preference shown in the drawings as adapted to a railway-crossing, and the following description is drawn to explain its operation in this connection, though we wish it distinctly understood that our invention is equally adaptable to and possesses equal advantages when used in other connections wherein the same objects are to be attained as are accomplished in its adaptation as shown in the drawings.

In the drawings, Figure 1 is a perspective view of a railway-crossing provided with our improved gates; Fig. 2, a rear view of the operating-post, having the cap removed to show the mechanism for working the gates; Fig. 3, a vertical section taken on the line 3 3 of Fig. 2, viewed in the direction of the arrow-heads; Fig. 4, a vertical section taken through one of the other posts, showing the mechanism by means of which the pivoted bars are raised and lowered; Fig. 5, a transverse section of the device represented in Fig. 1, showing the connection between the force and exhaust mechanisms; and Fig. 6 a sectional view showing the construction of details.

A is the post from which the pivoted bar which it supports and the bars supported by the posts A', A^2, and A^3 are operated, and which therefore contains the mechanism whereby atmospheric pressure is generated to raise or lower the gates, raising or lowering them by either condensed or exhaust air pressure, depending upon the position of the piston-rod, (see Figs. 3 and 4,) being either in front of or behind the point of equilibrium in the pivoted bars.

B, Figs. 2 and 3, is an atmospheric-pressure pump worked by the handle u, and communicating by means of the pipe t with the air-cylinder C, and by means of connecting-pipes $s\ s$ with the pipes t', t^2, and t^3, and through the medium of the last-named with the exhaust-cylinder D. Communication of one tube with either or all of the others and with the condensed air and exhaust cylinders is opened or closed by means of suitable taps, r, r', r^2, and r^3, the last-named of which is of a construction different from the other taps, as will hereinafter be particularly described. The pipe t' leads to the post A', where it communicates, by means of a branch pipe, z, as shown in Fig. 4 of the drawings, with a cylinder, E, Fig. 4, carrying a piston and rod, q, and the same pipe, t', communicates at its opposite end, also by means of a branch pipe, z, (see Fig. 3,) with the cylinder E', carrying the piston and rod q', Fig. 3. The pipe t^2 in the operating-post leads to the post A^2, and thence to the post A^3, communicating at each with a cylinder and piston, in the manner described in connection with the posts A and A'.

G, Fig. 2, is a suction-pump operated by the handle l, Fig. 1, and communicating, by means of the pipe t^3, with the exhaust-cylinder D, and by the same means, through the connecting-pipe $s\ s$ and taps r^2 and r', with the pipes t^2, t', and t and cylinder C. The bars, which are made heaviest toward their rear ends, are pivoted each to a post at a point, x, which is the center of gravity of each bar. Secured to the under side of the cap o, toward

the rear end of each bar, somewhat forward of the center of gravity, is an arm, F, (see Figs. 3 and 4,) preferably of the form shown, and provided with an opening near one extremity to receive the bolt *n*, upon which a link, *m*, is secured near one end, the link being pivotally secured at its opposite end to the piston-rod. The positions of the arm F and piston are necessarily somewhat to one side of the center of gravity, though they are preferably in vertical line, or nearly so, with each other, in order that the length of the arm F may be of the minimum. As shown in the drawings, and as the construction is intended to be, each bar will, when raised or lowered, describe a quarter of a circle, being prevented from moving in a backward direction from its perpendicular position owing to the fact that the inner surface of the cap *o* bears against the rear side of the post, and in a forward direction from its horizontal position owing to the fact that the inner surface of the cap *o* rests upon the top of the post, a stop being thus afforded in either instance. The sweep described by the links *m* in the operation of the bars is of course like that of the bars themselves—an arc forming one-fourth of a circle, the dimension of this arc obviously depending upon the distance of the center of the said circle from the pivotal point of each bar. The greater such distance the greater the sweep, and consequent necessary length, of the link *m*. The smallest practicable sweep attainable for the link *m*, when the resting-points of the head thereof will be vertically opposite each other upon the segment of the arc of the sweep, is acquired by locating the center of the circle, the mechanism being formed as hereinbefore described, about six inches from the pivotal point of each bar. The piston-rods and cylinders are suitably supported by means of braces *k*. It should be borne in mind that the bars are balanced at their pivotal points, and would remain in a horizontal position of their own accord when lowered, from which it would not require very great power to start them to rise, and but sufficient to counteract the friction at the pivotal point to cause them to continue rising, so that it will readily be understood that they are necessarily operated in one direction by condensed force or pressure and in the other by suction or exhaust force, the use of the one or the other for either purpose depending upon the position of the piston mechanism and arm F, whether in front of or behind the pivotal point *x*—that is to say, if they are to be lowered by suction force and raised by condensed force, these parts would have to operate in front of, and if vice versa they should be behind, the pivotal points. It is preferred to provide means whereby the rear ends of the swinging bars may be rendered heavier than the opposite ends, in order that (the piston operating, as then preferred, in front of the pivotal point, and the lowering being effected by exhaust-air or suction force and the raising by condensed-air force) the greater or suction power and the lesser or pressure power shall be nearly, if not quite, equalized in their effect upon the arms. This variation in the respective weights of the opposite ends of the bars is preferably produced, as shown in Figs. 1, 3, and 4 of the drawings, by sliding weights H.

Having by the foregoing prepared for the description of the operation of our device, we proceed to describe its operation, which is as follows: Suppose the four pivoted bars to be in the perpendicular position represented of the arms A and A′ in Fig. 1, and that it is desired to lower them all simultaneously. The cylinder C having previously been charged with air by means of the pump B, and the taps *r*, *r′*, and *r²* opened, (the normal state of the two last-named being open,) condensed air will have entered into the pipes *t′* and *t²* from the cylinder C, and have passed hence to the cylinders in the posts containing each a piston and rod, thus having caused the latter to raise the pivoted bars to a perpendicular position. To lower them the tap *r* is closed and the tap *r³* opened, to permit the air contained in the pipes *t′* and *t²* to rush into the exhaust provided in the cylinder D by means of the pump G, whereby the bars are lowered by the exhaust thus produced in the said pipes. The pipes *t* and *t³* are preferably twice the diameter of the pipes *t′* and *t²* and the latter twice that of the branch tubes *z*. The reason for this difference in the diameters of the pipes is obvious. Both pipes *t′* and *t²* are charged from the pipe *t* and exhausted through the pipe *t³*, and each pipe *t′* and *t²* operates two pistons through the medium of branch pipes *z*, which are formed of one-half the diameter of the pipes *t′* and *t²*, in order that the two opposite bars, operated through either of the said pipes, may work simultaneously and without too great force and velocity. Neither of these desirable results could be accomplished if the main and branch pipes were of the same diameter, since one bar would rise or fall before the other, and with a velocity and force that would cause it to rebound and greatly strain the parts. The difference, also, between the diameters of the cylinders C and D and pipes *t* and *t³* is purposely considerable, that of the latter being not necessarily more than one-half an inch, while that of the former may be six inches or more, the object of this difference being to render frequent operation of the pumps unnecessary.

The construction of the tap *r³*, as before stated, differs somewhat from that of the other taps, in the fact that it may be opened farther than is necessary to establish communication with the different pipes, as described, in order to admit air from without through the tube *g*, as shown in Fig. 6 of the drawings, to create a normal atmospheric pressure of about fifteen pounds to the square inch within the pipes *t′* and *t²* before bringing the compressed air from the cylinder C into requisition, when it is de-

sired to raise the gates, or to allow the condensed air contained in the pipes t' and t^2 to escape into space until normal pressure therein is produced, when they are exhausted into the cylinder D. When this has been done, for the purpose of admitting air into the pipes t' and t^2, the tap r^3 is closed and the tap r opened to fill the pipes t' and t^2 with compressed air, and thereby operate the pistons to raise the gates.

It may frequently happen that it is desired to close, and not frequently, if ever, though it may be done, to open, one gate at a time. Necessity for the first-named operation will occur when a vehicle is already upon and crossing the track, and it is desired to place a barrier before vehicles immediately behind it, but to offer no impediment to the first-named in clearing the tracks. This is effected by closing either the tap r' or the tap r^2, depending upon whether the gate formed by the arms A and A' or that formed by the arms A^2 and A^3 is to be lowered, so that the exhaust will be produced only in the one or the other, the closing of the remaining arms being effected at the proper time by merely opening the tap r' or r^2 which has been closed. To raise one side at a time, either tap r' or r^2 and the tap r^3, the latter to its full extent to admit air from without, are opened, and the exhaust produced in only one of the pipes t' or t^2, and in the other at the proper time by opening the tap which had previously been closed.

The sliding weight H is not an essential feature of our device when operated by both pressure and exhaust, but is useful if ever it should become necessary to use only the one or the other, since it will suffice alone to raise or lower the arms, if the counteracting effect of suction or pressure, as the case may be, is removed. In all cases it is intended that the sliding weight shall be detachable and adjustable either behind or in front of the center of gravity.

It may sometimes be advisable to form gates not only on each side of a crossing, but likewise on each side of the various tracks upon the crossing. This may readily be done without changing the operative principle of our invention, the only change necessary being in the relative dimensions of the pipes.

It is possible to operate our device without the use of the exhaust-cylinder D, when the pump G and pipe t^3 could be dispensed with, by permitting the air contained in the different pipes to exhaust through the tap r^3 into space; and under some conditions this may be the preferred construction, though ordinarily the cylinder D will be found useful in producing smooth and rapid action of the device.

What we claim as new, and desire to secure by Letters Patent, is—

1. In a vertically-swinging gate, the combination, with the bars pivotally secured to posts, of mechanism actuated by atmospheric pressure to operate the bars, said mechanism comprising a cylinder, C, pressure-pump B, communicating with the said cylinder by means of a pipe, t, pipes t, t', and t^2, provided with taps r, r', and r^2, and rendered communicable with each other and with the cylinder C by means of suitable connecting-pipe, $s\,s$, and a piston cylinder and rod for each bar, communicating with the pipes t' and t^2, all being arranged to operate substantially as described.

2. In a vertically-swinging gate, the combination, with the bars pivotally secured to posts, of mechanism actuated by atmospheric pressure to operate the bars, said mechanism comprising a cylinder, D, exhaust-pump G, communicating with the said cylinder by means of a pipe, t^3, pipes t^3, t^2, and t', provided with taps r^3, r^2, and r', and rendered communicable with each other and with the cylinder D by means of suitable connecting-pipe, $s\,s$, and a piston cylinder and rod for each bar, communicating with the pipes t' and t^2, all being arranged to operate substantially as described.

3. In combination with vertically-swinging gates, mechanism for operating the said gates, comprising an atmospheric-pressure pump, B, pressure-cylinder C, connected with the said pump, pipes t, t', t^2, and t^3, provided with suitable taps, r, r', r^2, and r^3, and communicating with the cylinder C and the exhaust-cylinder D by means of suitable connecting-pipe, $s\,s$, exhaust-pump G, cylinder D, communicating with the pump G, and cylinders, each containing a piston and rod—one for each bar—and communicating with the pipes t' and t^2, all being arranged to operate substantially as described.

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MORTIMER B. MILLS.

In presence of—
C. C. LINTHICUM,
DOUGLAS DYRENFORTH.